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Please replace the specification as originally filed, with the enclosed substitute specification. A marked-up copy of the original specification showing the changes made to create the substitute specification has also been enclosed. Applicant states that no new matter has been added to the substitute specification.



Docket #71118

## A LIGHTING DEVICE OF AN ELECTRO-LUMINESCENT LIGHTING DEVICE

### CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of priority under 35 U.S.C. § 119 of Chinese patent application 03201593.3 filed 5/March/2003, the entire contents of which are incorporated herein by reference.

### 5 FIELD OF THE INVENTION

[0002] The present invention relates to a type of electro-luminescent lighting device. In more detail, it relates to using one or multiple electro-luminescent lamps and its base to form a electro-luminescent laser lighting device. The present invention modifies the structure, changes the shapes and color, applies implements, decorations, warnings marks etc, and provides a sealing  
10 and water-prove isolator for safety.

## BACKGROUND OF THE INVENTION

[0003] Electro-luminescent (EL) or so-called laser was discovered in 1963. It is emission of light by an electric field. Nowadays there are many kinds of shapes being developed; such as flat shapes, cylinder shapes, hammer shapes, 2-D, 3-D, board strip shapes, slice shapes, pipe shapes, stick shapes and narrow strip shapes etc. They never get use widely in daily life. The reasons are:

1. Generally they are uncovered outdoors, or not protected properly, and are therefore dangerous.
2. Even through some shapes, colors and specifications are developed, there are still restrictions in certain places or areas, and therefore can only be used in certain areas.
3. Uncovered EL present outdoors or directly contacting with other parts easy causes damage or even creates electric danger.

## SUMMARY OF THE INVENTION

[0004] The purpose of the present invention is to provide a stable combination of an electro-luminescent (EL) lamp and a base as a novel lighting device.

[0005] According to the present invention, the luminary of the EL lamp as a lighting device comprises one or many kinds of EL lamps and bases. The EL lamp has a main body and multiple individual extending electrodes. It has an isolator on one side of the electrode as well as an isolator for the main body, the other side is the electric conductor for the extending electrode. There are many holes or crevices in the bottom of the base going through two ends of the base.

The extending electrodes, individually or simultaneously, go through these holes or crevices to be fixed in position. The luminary is arranged in one end of the base. The extending electrode is arranged on the other end of base with a tail lying closely to the outside wall of the base. The electric conductor surface faces outward to a predetermined position and connects the luminary to the power. The luminary is preformed into shapes, colors, style, words or results.

[0006] An electro-luminescent lighting device has a slim and flat shape, such that the electro-luminescent lighting device can be a long strip, a square, a circle, a star and many other shapes. Further, the lighting device can also have many kinds of predetermined pictures, colors or words. The lighting device can be made of elastic material, such as hard and soft materials.

[0007] An enclosure is used to seal the electro-luminescent lighting device, the fixed base and part of the electric conductor. The gap in the enclosure is filled with articles pervious to light, articles of light reflection, articles of light retraction or different color items. The enclosure has an open part to be fixed on the base. The enclosure is composed of many pieces fixed on the base. The enclosure shapes can be pepper shapes, flame shapes, circle shapes, pipe shapes, star shapes and specifically designed shapes. The enclosure can be transparent or translucent with many colors. The enclosure colors can be permeated into new material, or attached to the inner surface or outer surface or printing marks. The inner surface or the outer surface of the enclosure can have rough or uneven lines. The enclosure can also have another hole. The material of the enclosure can be provided with pictures, trademarks, logos and advertising materials. Further, the enclosure can be single or multiple types, such as slim flat shapes, panel shapes, sheet shapes, tube

shapes, bar shapes, strip shapes, cylinder shapes, hammer shapes, a 2-dimensional lighting shape or a 3-dimensional lighting shape. The filler items or the isolator can be used to separate the different electrodes.

**[0008]** Other light sources of the electro-luminescent lighting device can be incandescent lighting elements, fluorescent lighting elements, vacuum lamps, gas filled lamps, Halogen lighting elements or LED, etc.

**[0009]** The present invention also provides a method for manufacturing an electro-luminescent lighting device. The procedures are as follows:

**[0010]** 1. Putting the electric conductor on the fixed position base, with two ends of electric conductor extending outside the fixed position base;

**[0011]** 2. Connecting the electrodes of the electro-luminescent device, individually or together, on one end of the electric conductor;

**[0012]** 3. Making the other end of electric conductor individually or simultaneously go through holes, or clipping it between the crevices in the fixed position base, making the tail of electric conductor revealed outside the bottom base;

**[0013]** 4. Placing the enclosure on the base to contain the electric conductor, electro-luminescent lighting device, fixed position base and whole or part of the base;

**[0014]** 5. Connecting the tail of the electric conductor with the power to establish

(develop) the expected (predetermined) shapes, colors, pictures (graphs) or words.

**[0015]** In the present invention, the electro-luminescent lighting device has many electrodes, individually or simultaneously connected to one end of electric conductors. Another  
5 end of the electric conductors are individually or simultaneously going through the holes in the base, or being clipped between crevices in the base to be fixed in position. The tail of electric conductors are exposed outside the bottom base. The whole light device is able to be interchanged.

**[0016]** The electric conductors are fixed on the fixed position base. Two ends of the  
10 electric conductors extend individually outside the fixed position bases. The electro-luminescent lighting device with many electrodes are, individually or simultaneously, connected to one end of the electric conductor. Then another end of the electric conductor individually or simultaneously go through the holes, or get clipped between the crevices, of the base to be fixed in position. The tail of the electric conductor is exposed outside the base. Further, the parts mentioned above can  
15 be omitted in the structure, and the procedures are also able to be easier.

**[0017]** The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its uses, reference is made to the accompanying drawings and descriptive matter in which preferred

embodiments of the invention are illustrated.

## BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

[0018] Fig 1 is a perspective view of the electro-luminescent (EL) lighting device lamp of  
5 the present invention.

[0019] Fig 2 is the first embodiment of a disassembling view of the present invention.

[0020] Fig 3 is the second embodiment of a disassembling view of the present invention.

[0021] Fig 4 is the third embodiment of a disassembling view of the present invention.

[0022] Fig 5 is the flat perspective view of the present invention.

10 [0023] Fig 6 is another embodiment with a flat perspective view of the present invention.

[0024] Fig 7 is the fourth embodiment of disassembling view of the present invention.

[0025] Fig 8 is the perspective view of the snowman shape of the present invention.

[0026] Fig 9 is the fifth embodiment of disassembling view of the present invention.

[0027] Fig 10 is the series-parallel disassembling view of the present invention.

15 [0028] Fig 11 is another perspective view of the pipe shape electro-luminescent (EL)  
lighting device of the present invention.

[0029] Fig 12 is a perspective view of a connector inside the electro-luminescent (EL)  
lighting device of the present invention.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0030] Referring to the drawings, in particular Fig 1, two electric conductors 21 using multiple isolators such as glass, are fixed on the fixed base 31 with two parallel electrodes. The multiple electro-luminescent (EL) lighting devices 11 have two diodes individually connecting with the electric conductor 21. Their jointer 23 may be fixed via glue, a press fit or solder. The enclosure 51 contains the electro-luminescent (EL) lighting device 11, the fixed base 31 and part of the electric conductor 21. Enclosed area 52 is isolated from the external world. Electric conductor 21 has an end 22 which is connected to power, and thus the electro-luminescent (EL) lighting device 11 has a lightened luminary 12 having an appearance with multi-layer colors and a predetermined diagram or drawing.

[0031] Referring to Fig 2, including Figures 2A and 2B, each end of two electric conductors 21 connect with a slice shape of two electric pillars of the electro-luminescent (EL) lighting device 11. Their jointer 23 may be fixed via glue, a press fit or solder. One end 22 of the electric conductors 21 go through the large end 421 of the hole in the end base 41. The large end 421 encloses part of electro-luminescent (EL) lighting device 11 and the whole jointer 23. This end 22 goes through a small hole in the end base 41 and extends to outside of the other end of the end base 41. The end 22 is bent and is arranged closely to the outside wall 44 at a predetermined power point. The end base 41 and the lamp holder 61 connect by pushing end base 41 into hole 63 and also connects with conductor wire 82. After turning on the power, the luminary 12 lights up and shows its colors with diagram such as the words "Merry Christmas".



**[0032]** Referring to Fig 3, including Figures 3A and 3B, three electric conductors 21 use the isolator of the fixed base 31 to separate them apart. Two of the ends 22 extend to the outside of the fixed base 31. Two relative (ending) electrodes of the electro-luminescent (EL) lighting device 11 connect with electric conductor 21. One end of the two electro-luminescent (EL) lighting devices 11, 12 simultaneously connect with electric conductor 21 to become a shared electrode. Another electrode of the electro-luminescent (EL) lighting device 11, 12 separately connects with the electric conductors 21. The other ends 22 of the electric conductors 21 goes through the hole in the base 41 to its large hole end 421. The large hole end 421 includes part of electro-luminescent (EL) lighting device 11, and part of or the whole part of the jointer 23, and the fixed base 31. End 22 goes through the small part of hole to extend to the outside of the other end of the end base 41. By bending the three ends 22 to make them lie closely to the outside wall 44 they can connect to a predetermined power point. The end base 41 and the lamp holder 61 connect by pushing-in hole 63 to and connect with three conductor wires 82. After turning on the power, the luminary 12 is lite up and shows its colors with an expected diagram.

**[0033]** Referring to Figures 4A and 4B, four electric conductors 21 use the isolator of the fixed base 31 to separate them apart. Two of the ends 22 extend to the outside of the fixed base 31. Two relative ends of the electrode in the electro-luminescent (EL) lighting device 11 are separately connected with one end of the four electric conductors 21. The other ends 22 go through the hole in the end base 41. Thus ends 22 go through the small hole that extends to the outside of the other end of the base 41. The four ends 22 are bent to make them lie closely to the outside wall 44 at the expected power point. The base 41 and the lamp holder 61 are connected

by pushing base 41 into hole 63 and connecting with four conductor lines 82. After turning on the power, the luminary 12 lights up showing its colors and the expected diagram.

[0034] Referring to Figures 5A, 5B and 5C, the electro-luminescent (EL) lighting device 11 can be either flat shaped, sheet shaped, tube shaped, bar shaped, cylinder shaped etc., and having luminary 12 and electrode 13. The end base 41 is composed of a pair of sliced bases 41a, and 41b with a gap 43 between in them. The electro-luminescent (EL) lighting device 11, including part of luminary 12 and electrode 13, is put between the gap 43, to clip tightly with base 41a and base 41b. A large part of luminary 12 extends on the other end. Electrode 13 is bent to lie closely to the outside wall 44 at the expected (predetermined) power point. The base 41 and the lamp holder 61 are connected by pushing the base 41 into hole 63 and to connect with power. After turning on the power, the luminary 12 is lite up and shows its colors with the expected diagram.

[0035] Referring to Figures 6A, 6B and 6C, the electro-luminescent (EL) lighting device 11 can be either flat shaped, sheet shaped, tube-shaped, bar shaped or cylinder shaped etc., having luminary 12 and electrode 13. The end base 41 is composed of a pair sliced base 41a, base 41b and a gap 43 between them. The electro-luminescent (EL) lighting device 11, including part of luminary 12 and electrode 13, is put between the gap 43, to clip tightly with base 41a and base 41b. A large part of luminary 12 is on the other end. The base 41 has a concave groove 46. The enclosure 51 has the flange 57 to hook up tightly with the concave groove 46 and enclose within the electro-luminescent (EL) lighting device 11. The enclosure 51 maybe a long tube shape, the

length might be extended depending on the situation. Inside the inner wall of this enclosure 51 may be a rough and uneven surface 56 to increase the reflection and refraction affect. When providing power to electrode 13, the electro-luminescent (EL) lighting device 11 appearance as a long and multiple style lighting device.

5     **[0036]**         Referring to Figures 7A and 7B, an electro-luminescent (EL) lighting device 11 with an end base 41 is arranged on the lamp holder 61. The lamp holder 61 has a buckle 64 and also has a gap 52, an open edge area 54, a rough-uneven surface 56, a flange 57 and a hole 58. The open edge area 54 fixes the electro-luminescent (EL) lighting device 11. The end base 41 and part of the lamp holder 61 use the buckle 64 which is to be bent and hooked in order to fix the  
10     flange 57 in position. Also filler 53 can be added in the gap 52 of the enclosure 51. The electro-luminescent (EL) lighting device 11 lightens up after the power is on. Light reflects or refracts out via filler 53, the rough-uneven surface 56 and the enclosure 51 outer wall 44 and also shines out from the hole 58 to display the expected diagram, shapes and colors.

15     **[0037]**         Referring Fig 8, an electro-luminescent (EL) lighting device 11 having a snowman shape is mounted on a device with a skew shape 45. The electrodes of the electro-luminescent (EL) lighting device 11 connect to the positive terminal 451 and negative terminal 452 of the skew shape 45. The appearance of the snowman 3-D luminary device is obtained after the connection of the power, to match the skew shape lamp holder.

**[0038]**         Referring Fig 9, the electro-luminescent (EL) lighting device 11 has many flat

shape luminosities 12, simultaneously or individually connected to the multiple electric conductors 21, its jointer 23 may pressed, soldered etc. The multiple electric conductor 21 is separately fixed on the fixed base 31. Other ends of the electric conductor 21 are connected into the skew shape 45 respectively on the positive and negative terminals. To match the screw type lamp holder, the flames shape enclosure 51 including the luminosity 12, jointer 23, and fixed base 31 are fixed in the gap 52. A multiple style lighting device is obtained and displays the flames shape, and multiple colors after switching on the power.

[0039] Referring Fig 10, many electro-luminescent (EL) lighting devices 11 with the base 41, lamp holder 61 and enclosure 51, and the conductor wire 82 are connected in serial and parallel. The power supply group 81 is to provide the power with a serial parallel circuit. Many kinds of shapes of enclosures 51, such as circle, flames etc. are used to display many different shapes, colors of the lighting device.

[0040] Referring Figures 11A, 11B, 11C, 11D, 11E and 11F, a kind of tube shape lighting device includes a long strip luminosity 12, conductor wire 82 and other illuminate lighting sources 91. A "Y" shape filler 53 is used as a isolator, and is contained by a long tube shaped enclosure 51. A detailed description is not needed here. The luminosity 12 and other illuminate lighting source 91 are connected with the same or different power source, to display individual characters and provide different electric ratings or different circuits. After turning on the power, luminosity 12 displays a long strip lighting source, and the other illuminate lighting sources 91 appear as a dot shape lighting source. Then filler 53 and outer wall 44 of enclosure 51 reflect or refract the

light to display multiple light effects in a long tube shape lighting device.

[0041] Referring Fig 12 including 12A and 12B, many luminosities 12 connect to the jointer 23 individually. A plurality of male jointers 231 or female jointers 232 are arranged to form a male connect holder 412 or a female connect holder 411, respectively. The male connect holder 411 and female connect holder 412 can be continuously connected to form multiple long string shapes, and can also be connected with a transformer or controller device 71, a conductor wire 82, a power supply group 81, or the tube enclosure 51 containing the luminosity 12. The surface of the enclosure 51 can display an inner rough-uneven surface 55. The power supply group 81 provides the power via a transformer or controller device 71, providing power to every luminosity 12, to form a multiple display lighting device.

[0042] While specific embodiments of the invention have been shown and described in detail to illustrate the application of the principles of the invention, it will be understood that the invention may be embodied otherwise without departing from such principles.